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A TEST FOR ADEQUACY OF BLANCHING IN FROZEN VEGETABLES

Western Regional Research Laboratory, Albany, California
Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
U. S. Department of Agriculture

The test for adequacy of blanching in frozen vegetables described below is based upon the determination of peroxidase activity by a method which has given good correlation with the keeping quality of certain frozen vegetables held in freezing storage at -5° F. for a period of four years.

Present knowledge concerning the test indicates that it is applicable to frozen peas, snap beans, lima beans, asparagus, and cut corn. There is no reason to believe that it will not prove applicable to other frozen vegetables.

Reagents

1. Distilled water.
2. 0.5-percent guaiacol in 50-percent ethyl alcohol solution.
3. 0.08-percent hydrogen peroxide (2.8 cc. of 30-percent hydrogen peroxide per liter). Keep in refrigerator in dark bottle, and renew each week or two.
4. Clean sand.

Apparatus

1. Test tubes, 3/4 or 7/8 inch in diameter.
2. Three- or four-inch diameter funnels.
3. Six- or seven-inch cotton milk filters.
4. Waring Blendor or similar mixer, or porcelain mortar (4- to 6-inch diameter) and pestle.
5. Fifty-cc. graduated cylinder.
6. One- and 2-cc. pipettes.
7. Timer or watch with second hand.
8. Test-tube rack.
9. Balance which will weigh 10-gram samples to ±0.1 gram.
   (Any triple-beam-type balance is recommended in preference to the single-beam, Harvard type).
   If Blendor is used, a larger sample will permit use of less sensitive balance.

Procedure

A. Using Blendor

1. Weigh out representative 100- to 200-gram sample.
2. Place in Blendor with 3 cc. water to each gram of vegetable.
3. Grind for 1 minute at moderate or high speed.
4. Filter through cotton milk filter.
5. Add 2 cc. of filtrate to 20 cc. of distilled water in test tube.

6. Prepare a blank by adding 2 cc. of filtrate to 22 cc. of distilled water in a second test tube, mix, and use as a color comparison tube. (Do not add any guaiacol or perioxide to this tube).

7. Add 1 cc. of 1/2-percent guaiacol solution to first tube (5), without mixing.
8. Add 1 cc. of 8/100-percent hydrogen peroxide to the same tube, without mixing.
9. Mix contents thoroughly by inverting and watch for development of any color differing from tube 6, regardless of hue, but of sufficient intensity to show an obvious contrast to tube 6. This is a positive test, and indicates inadequate blanching. If no such color contrast develops in 3-1/2 minutes, consider the test negative and the product adequately blanched. If color develops after 3-1/2 minutes, it is to be disregarded, and the test still considered negative. (For further information see full report, Masure, M. P. and Campbell. H., "Rapid Estimation of Peroxidase in Vegetable Extracts--An Index of Blanching Adequacy for Frozen Vegetables," Fruit Prod. Jour. and Amer. Food Mfr. 23:369-375, 383, Aug. 1944).

B. Using Mortar

1. Cut tissue to be tested into small pieces and weigh out representative 10-gram sample.
2. Place 30 cc. distilled water in graduated cylinder.
3. Place sample in mortar with a little clean sand, add minimum amount of water from graduated cylinder to give best consistency for thorough maceration, and grind for 3 minutes. Add remainder of water from graduate, and mix.
4. Filter through cotton milk filter.
5. Add 2 cc. of filtrate to 20 cc. of distilled water in test tube.
6. Prepare a blank by adding 2 cc. of filtrate to 22 cc. of distilled water in a second test tube, mix, and use as a color comparison tube. (Do not add any guaiacol or peroxide to this tube).
7. Add 1 cc. of 1/2-percent guaiacol solution to first tube (5), without mixing.
8. Add 1 cc. of 8/100-percent hydrogen peroxide to the same tube, without mixing.
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Sampling

To insure adequate blanching of all units of the product, select the largest pieces or parts, since these are the most likely to be underblanched. At least, select a sample with a large proportion of large pieces. With some vegetables, like broccoli, for example, a more complete knowledge of adequacy of blanch can be obtained by testing stalk and floral parts separately. With such products it is especially important to use a large sample, or more than one sample, so as to include a sufficient number of units to overcome size variability and tissue differentiation.

A. Using Blendor with 100- to 200-gram samples.

With vegetables which may be in very large pieces, like broccoli, either test different tissues separately, or cut so as to secure normal proportions from a number of units.

B. Using mortar with 10-gram samples.

Because of the limits of mortar grinding, special attention should be given to securing representative samples. Sample size can be increased to 20 or 30 grams with additional time given to grinding, or the number of units represented can be increased by halving or quartering if they are symmetrical. With large-seeded lima beans, for example, the number of units can be doubled by cutting each seed in half across the cotyledons. With asparagus, the following procedure is recommended:

1. Cut and discard 3/4 inch from butt end.
2. Split spears lengthwise, or if very thick, quarter.
3. Use alternate 1/2-inch cuts from half or quarter of each spear, discarding every other cut.

In case of doubt, test more than one sample.

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